

In order to have the flat wire accepted in the code's 1978 edition, NASA and interested companies have commissioned fact-finding studies at Underwriter's Laboratories to provide necessary technical data.

The flat wire and some of the other developments reported above will be demonstrated in the "Tech House" to be constructed this year by NASA at its Langley Research Center near Hampton, Va. Both the Department of Housing & Urban Development and the National Association of Home Builders have served as advisors in planning Tech House. It is described in Section one of this report under "Your Home."

Tool for movable ceiling

The University of Akron's performing arts hall is a cultural and architectural triumph. It was constructed to accommodate concerts, opera, ballet, and theater productions. These may be cultural relatives, but they are architectural opposites, because the main hall has to shrink and expand to accommodate audiences as large as 3,000 and as small as 900.

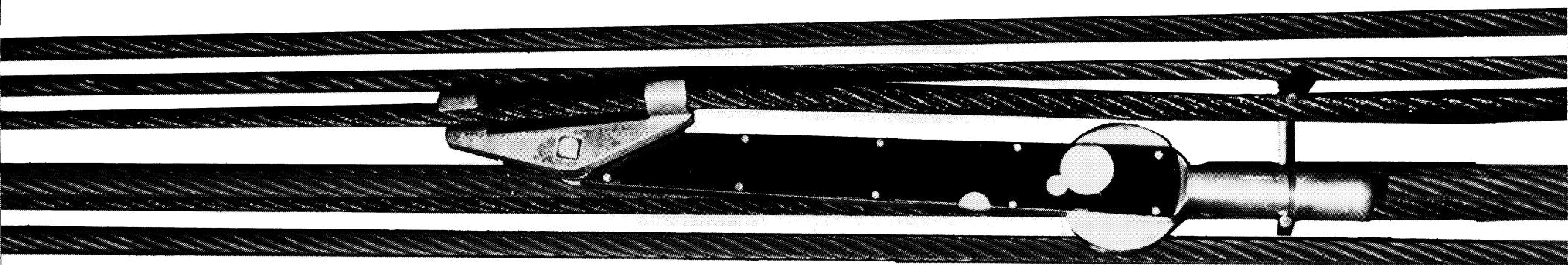
Movable ceilings were required not only to alter the size of the main hall, but also to regulate the volume and manipulate the acoustics.

The movable ceiling, the most modern in the U.S., contains overhead hexagons that can be lowered in clusters to exclude either 600 seats or an additional 1,500 seats.

Once the hall has been sound-tuned, the various positions of this ingenious ceiling and related acoustic curtains may be called into play immediately by pushing buttons on a control console that has been programmed previously. With the touch of a finger before an event, a technician may condition the hall for chamber music, symphony, or theater.

A simple, inexpensive tool devised in the space program was used to equalize tensions in the 150 cables of the ceiling. The tool was developed sometime before by the Bendix Corp., under contract to NASA's Kennedy Space Center, to adjust the relative tension in elevator and crane cables. The 425-ft mobile launch tower contains two elevators for lifting spacecraft. The crane in the vehicle assembly

Inexpensive tool to equalize tensions in cables of movable concert-hall ceiling was developed first for elevator and crane cables used to lift heavy space vehicles at Kennedy Space Center.



building and other hoists at Kennedy also utilize load-bearing cables.

Previous commercially available cable tools weigh 16 lbs. The Bendifix tool weighs only 2 lbs and costs a tenth as much. It consists of a short plate that can be attached to the cable, a torque wrench to twist the plate while it is attached to the cable, and a hook to hold the wrench at a uniform distance from the cable. Cable tensions in a suspension system are compared with this tool so that equalizing adjustments can be made.

Izenour Associates Inc., New Haven, Conn., further adapted the NASA tool into a multi-cable version for use in the Akron hall movable ceiling.

In a related if more prosaic application, the elevator division of Dover Corp., Memphis, uses similar NASA-spawned cable-tension tools to measure and adjust the tension on elevator cables in office and other buildings during installation and inspections. The tool saves about 20% of adjustment time and increases cable and pulley life.

'Rigidized' metal panels

Not all of NASA's industrial assistance includes direct technology funding or even transfers of aerospace research. Sometimes the catalyst is more subtle. NASA maintains six industrial applications centers at universities throughout the country which have computerized access to about three-quarters of a million space-related reports as well as 10 times that many reports and articles from private sources.

Typical of the several companies served annually, the Plasteel Products Corp., in Washington County, Pa. approached one of these NASA information centers to search for ideas on "rigidized" metal sheeting. Thinner-gage metal with the strength of heavier sheeting can be obtained through cold bending, stamping, dimpling, or embossing—referred to as "rigidizing."

The NASA Industrial Applications Center at the University of Pittsburgh came up with 36 reports relevant to Plasteel's needs. On the basis of this research, the company purchased an embossing machine with which it hopes to provide thinner-gage metal panels where permitted by building codes.

Space paint

An improved inorganic paint may help protect coastal bridges, which are subject to extreme corrosion from seawater spray.

Zinc-rich coatings with both organic and inorganic binders have been tried in the past. But organic paints don't last as long and require a finish coat, while inorganics normally are harder to apply but require only one coat.

The unique inorganic zinc-dust coating was developed at NASA's Goddard Space Flight Center. In preparation, potassium silicate is formulated into a thin, water-base binder that sprays easily, adheres readily, and can be heavily loaded with zinc particles to provide uniform coverage in a single coat.

One gallon of the paint covers 375 square feet, compared with the usual coverage for inorganic paints of about 200 square feet per gallon. In addition, the life of the paint may be doubled leading to significant cost and savings.

The Golden Gate Bridge Authority now is testing the space paint on a girder of the famous bridge. Stanford Research Institute, a NASA Technology Applications Team, has measured an annual market in excess of \$2-billion in painting highway bridges, utility pipelines, nuclear reactors, and railcar hoppers. Other suitable markets include offshore drilling facilities, railroad bridges, and ships. Patent licenses may be obtained from NASA.



New space paint is applied to girder of Golden Gate Bridge to test its resistance to salt spray and weathering. The inorganic paint requires only one coat and is expected to last twice as long as conventional paints.